DIMENSIONAL COMPLEXITY AND EVALUATIVE EXTREMITY: A COGNITIVE MODEL PREDICTING POLARIZED EVALUATIONS OF OUTGROUP MEMBERS

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Dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Psychology in the Graduate School of Duke University

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ABSTRACT

(Psychology-Social)

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A model of social judgment was developed and applied to ingroup-outgroup evaluative biases. In this model, the concept of dimensional complexity is hypothesized to mediate evaluation judgment. The term "dimensional complexity" is used here to denote the number of conceptual dimensions that a person uses to represent stimuli in a particular domain. The model consists of the following three theoretically linked hypotheses. (a) The ingroup-outgroup complexity hypothesis: People have a more complex cognitive representation of their own group than of other groups. (b) The complexity-extremity hypothesis: The less the complexity of the representation of a stimulus domain, the more extreme will be the evaluation of stimuli from that domain. (c) The ingroup-outgroup extremity hypothesis: If hypotheses one and two are true, then it follows that on the average people will evaluate outgroup members more extremely than

ingroup members. Under certain circumstances, evaluative extremity will take the form of a polarization effect. Hypothesis one was tested by measuring subjects' cognitive complexity regarding their own age group compared to another age group. The results revealed that young male subjects demonstrated greater complexity in their descriptions of young males than in their descriptions of old males. Hypothesis two was tested in two separate experiments. In the first, dimensional complexity was measured as an individual difference variable. The results revealed that less complexity regarding old males was correlated with more extreme evaluations of old males. In the second, dimensional complexity was manipulated through task instructions. This study involved evaluations of nonsocial stimuli, namely, cookies. The results indicated that instructions to think about fewer dimensions relevant to cookies lead to more extreme evaluations across a set of cookies. Hypothesis three was tested by crossing the ingroup-outgroup status of the target person with favorability of the information about the target person. Again using age as an ingroup-outgroup variable, the results revealed that young subjects evaluated old males more extremely than young males. Evaluative extremity took the predicted form of a polarization pattern. When the information about the male was favorable, the old male was evaluated more positively than the young male; when the information was unfavorable, the old male was evaluated more negatively. The present results thus support a bidirectional rather than a unidirectional ingroup-outgroup bias such as ingroup favoritism.

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P. W. L.

CONTENTS

LIST OF TABLES AND FIGURES

INTRODUCTION

Overview

This research examines how people conceptualize ingroups and outgroups, and how these conceptualizations affect evaluative judgments. I will propose and test a rather specific model of the cognitive processes that mediate evaluative judgments. This model will be applied to the evaluations of ingroup and outgroup members. The model can be summarized in terms of three linked hypotheses: (a) The ingroup-outgroup complexity hypothesis: People have a more complex cognitive representation of their own group than of other groups. (b) The complexity-extremity hypothesis: The less the complexity of the representation of a stimulus domain, the more extreme will be the evaluations of stimuli from that domain. (c) The ingroup-outgroup extremity hypothesis: If the first and second hypotheses are true, then it follows that, on the average, people will evaluate outgroup members more extremely than ingroup members, more extremely in either a positive or a negative direction depending on the favorability of the information they possess about that member. When two target persons are chosen so that one is favorable and the other unfavorable, and when there is no overall mean difference in evaluation

for ingroup-outgroup status, then a polarization effect will emerge. When the target is favorable, the outgroup member will be evaluated more positively than the ingroup member; when the target is unfavorable, the outgroup member will be evaluated more negatively.

Stereotyping and Intergroup Evaluation

Stereotyping is one of the most socially relevant and most investigated areas in social psychology. Interest in the cognitive processes involved in the formation and use of stereotypes has a long history (cf. Allport, 1954; Lippmann, 1922). This interest derives from the belief that reactions to our environment are not based on the objective characteristics of that environment, but rather on the "pictures in our heads" (Lippmann, 1922). The cognitive structures that develop through interaction with our environment influence the manner in which we process information and respond to other persons and social group members.

Traditional approaches to stereotyping. Despite this early recognition of the importance of cognitive processes in stereotyping, research in this area has been more concerned with the content of stereotypes than with the processes underlying stereotyping. Traditional descriptive research was designed to assess racial and ethnic stereotype content (e.g., Katz & Braly, 1933). This traditional paradigm typically requires subjects to check those adjectives that best describe a specific ethnic group. Some investigators (Brigham, 1971; Brown, 1965; Taylor & Gardner, 1969) have noted that this paradigm may actually force subjects to think

about a target person in terms of categories and generalizations that they might not normally use. The result is likely to be an exaggeration of any tendency to stereotype. Given that subjects are only provided with one piece of information, ethnic identification, it is not surprising that trait attributions concerning an individual target person are quite similar to trait attributions associated with that particular ethnic group.

The traditional research paradigm is not adequate for studying the cognitive structures and processes underlying stereotyping behavior. To learn anything about the cognitive structures that mediate evaluations of stimuli for a given domain, one must observe responses to a variety of stimuli from the domain. Only in this way can we learn anything about those features of the stimulus that influence the response, or the information-processing rules that generate the response.

More recent investigations of trait attributions have used more complex information about target persons. Information about social class, occupational status, and specific behaviors is juxtaposed with ethnic membership. However, much of this research remains descriptive rather than theoretical in nature. Those investigators positing theoretical explanations for stereotyping have tended to focus on the functional, ego-defensive mechanisms and the faulty reasoning processes of the perceiver (see Hamilton, 1976). For example, much attention has been given to the motivational functions that stereotyping serve for the perceiver (e.g., self-esteem enhancement, or the reduction of anxiety and frustration

through projection and displacement). These dynamic forces have been assumed to "short circuit" normal cognitive functioning.

Recent cognitive approaches to stereotyping. Two recent approaches reflect a renewed interest in the normal cognitive processes underlying stereotyping and trait attribution. The first involves the application of attribution theory principles to the process of stereotypic attribution (Linville & Jones, 1979; McGillis & Jones, Note 1). Attribution theories have focused on the processes by which personal and environmental factors are assessed and weighted in making judgments regarding the causation of behavior (Bem, 1967, 1972; Jones & Davis, 1965; Kelley, 1967, 1971). Consider, for example, Kelley's augmentation principle (1971), which states that the extremity of an attribution based on one effect of an action will increase to the extent that causal factors are also present that would normally inhibit the action. Information about ethnic membership may be viewed as providing plausible inhibitory causes for the attainment of occupational status or specific behaviors. For example, knowing that a target person is both a black and a judge may imply a plausible inhibitory factor (black) for the attainment of a behavioral effect (judge). Thus, any plausible facilitatory factors such as the ability and motivation of a black will be viewed as stronger than those of a white judge. Consider next the discounting principle (Kelley, 1971) and the principle of non-common effects (Jones & Davis, 1965). They state that the role of a given cause in producing an effect is discounted to the degree that other causes are present.

For example, the salience of affirmative action pressures may be perceived as facilitating minority advancement and may thus undermine assessments of the ability and motivation of a black judge.

A second newly emerging body of literature suggests that normal cognitive processes are involved in social stereotyping. This research indicates that stereotyping is due in part to such information-processing factors as increased attention directed toward a salient or "solo" member within a group (McArthur & Post, 1977; Taylor & Fiske, 1978); the illusory perception of correlation, i.e., the overestimation of the number of undesirable characteristics associated with the smaller social group (Hamilton & Gifford, 1976); and social categorization processes (see Taylor, 1980; Wilder, 1980).

Stereotyping has long been recognized as dependent upon the tendency to group or categorize stimuli (Allport, 1954; Bruner, Goodnow, & Austin, 1956; Campbell, 1967; Tajfel, Shiekh, & Gardner, 1964). In his classic book on prejudice, Gordon Allport (1954) emphasized the similarity between categorizing persons and categorizing objects. Both Allport (1954) and Bruner et al. (1956) stressed the categorization process as an aid to the perceiver in simplifying an overabundance of available information. Similarly, stereotypes have been viewed as an aid to the perceiver in simplifying the processing of social information (Campbell, 1967; Tajfel, 1969, 1974). Cognitive psychologists have long recognized that objects are perceptually organized according to similarities and dissimilarities

(Bruner et al., 1956). Recent work in social cognition has taken a categorization approach to stereotyping, reaffirming that perceptions of persons are organized according to similarities, and salient cues such as race and sex readily generate categories that organize incoming information about group members (see Taylor, 1980, for a review).

There is consistent evidence from this literature that perceivers tend to minimize differences between members of the same group and maximize differences between members of different groups. Maximization of within-group similarity and between-group dissimilarity holds for groups based on nationality (Tajfel, Shiekh, & Gardner, 1964), race and sex (Taylor, Fiske, Etcoff, & Ruderman, 1978), as well as nonsocial stimuli such as lines grouped according to length (Tajfel & Wilkes, 1963).

Ingroup and outgroup favoritism. There is also consistent evidence from this literature that people show favoritism toward ingroup members (Allen & Wilder, 1975; Brewer & Silver, 1978; Tajfel, Billig, Bundy, & Flament, 1971). In a typical "ingroup-outgroup" study, subjects arrive at the experimental laboratory, are divided arbitrarily into two groups based on some trivial similarity or on task performance, and then make trait ratings or allocate monetary rewards regarding ingroup and outgroup members. Results consistently demonstrate that this arbitrary categorization contributes to favoritism toward the ingroup and discrimination against the outgroup. Subjects evaluate ingroup members more favorably, and they allocate larger amounts of monetary reward to ingroup

members even when the subjects themselves do not directly benefit (see Brewer, 1979; Hamilton, 1976; and Wilder, 1980, for reviews). It should be noted that again in this research paradigm, subjects are typically provided with only one piece of information about other group members--ingroup-outgroup status. In such a sterile context, a subject has nothing but group status per se on which to base judgments.

Other research, however, documents favoritism toward the outgroup or minorities. This research has been conducted by investigators applying attribution principles to the process of stereotypic attribution. In this paradigm, subjects are typically provided with information such as occupational status in addition to group membership. Several experiments show that white subjects rate a black professional higher on occupationally relevant traits than a comparable white professional (Feldman, 1972; Linville & Jones, 1979; McGillis & Jones, Note 1). Minority professionals may be the beneficiaries of Kelley's (1971) augmentation principle. To the extent that subjects perceive blacks as the victims of early environmental constraints, they may conclude that the black professional's ability and motivation must have been unusually strong to overcome the normally inhibiting obstacles to attain their professional status. Thus, the competence credentials of a black professional may be viewed as stronger than those of white professionals.

Since these studies primarily involved white subjects, this same result may be viewed in "ingroup-outgroup" terms. From this perspective,

it appears that when favorable information accompanies ethnic identification, an outgroup member (i.e., a black professional) is evaluated more favorably than an ingroup member (i.e., a white professional). With minimal information beyond ethnic identification or ingroup-outgroup status, however, an outgroup member is evaluated less favorably than an ingroup member.

A similar puzzling pattern of results is found in the area of age-related biases. An active older man was evaluated more positively than his younger counterpart (Sherman, Gold, & Sherman, 1978). Previous research, however, demonstrates that when little information except the age of a person is given, people are more negative in their attitudes toward older persons than toward people in general (McTavish, 1971).

Different motives may explain these different ingroup-outgroup biases. Egocentric motives or traditional prejudice attitudes may produce ingroup favoritism. Positive prejudice or social desirability needs (i.e., not wishing to show one's racism, sexism, or ageism) may produce outgroup favoritism. Thus some situations may evoke motives that promote favoritism toward ingroup members whereas others may evoke motives that promote favoritism toward outgroup members. Assuming such a motivational explanation, one would still need to explain which situations evoke which biasing motive.

Different attributional principles may also explain these different biases. The augmentation principle may lead to outgroup favoritism when

the outgroup is perceived as having to overcome environmental obstacles to obtain a behavioral effect. The discounting principle may lead to ingroup favoritism when the outgroup is perceived as receiving special advantages in obtaining a behavioral effect. To use an attributional explanation, one would need to argue that some situations evoke one principle, whereas other situations evoke the other principle.

Even though these motivational and attributional explanations are no doubt a part of the picture, the present research attempts to examine both ingroup and outgroup favoritism from a more parsimonious cognitive perspective. While the trend toward cognitive explanations of stereotyping has been fruitful, it is not clear that any existing cognitive approach can explain the puzzling pattern of both ingroup and outgroup favoritism. The present research takes a different cognitive approach, focusing on the complexity of the cognitive representation for ingroups and outgroups.

Dimensional Representation of Knowledge

According to the present model, evaluation is a result of a process that is at least partially structural in nature, a function of the representation of knowledge for a specified domain. Applying this model to intergroup perception, differential evaluation of ingroup and outgroup members is a partial function of the ways in which knowledge of ingroups and outgroups is structurally represented. Specifically, dimensional complexity of the representation of knowledge is a crucial factor mediating evaluative

judgment. Therefore, it will be useful at this point to define more precisely the concepts of representation of knowledge, social schemas, and dimensional complexity.

The human capacity to process information is extremely limited relative to the complexity of the social and physical environment. This implies that people selectively attend to and represent only a subset of the features of the environment. I am here adopting a common assumption that a person's representation of the world is dimensional in nature; that is, people represent a complex stimulus in terms of a few basic attributes of that stimulus.

The acquisition of dimensions is likely to come from direct observation and experience with our environment as well as from more indirect information provided by others. Knowledge is likely to be represented as specific past experiences and examples associated with a stimulus domain. Attributes or dimensions are likely to arise out of the process of abstracting features common to these experiences and examples. Thus the representation of knowledge consists partially of a collection of attributes or dimensions associated with a given domain. Even though these dimensions are based on experience, they achieve a status independent of particular experiences. These conceptual dimensions then become a part of the process by which we perceive and understand our environment.

This dimensional model assumes that people actively select, encode, categorize, and interpret information according to these relevant

dimensions. One selectively attends to features of the stimulus as well as encodes and interprets the stimulus in terms of key attributes. Strictly speaking, these features that are encoded are not actually properties of the stimulus but arise out of the process of interpreting salient stimulus properties.

Not only are the key attributes or dimensions associated with a given domain represented in knowledge, but experiences of relationships or correlations between attributes are similarly abstracted and represented. This is not a new concept in psychology. A belief concerning the co-occurrence of attributes is frequently referred to as an implicit personality theory (cf. Schneider, Hastorf, & Ellsworth, 1979). The term "implicit" refers to the fact that people cannot explicitly make clear the categories they use and how they are organized in correlational terms. Multidimensional scaling has been used as a technique to extract and represent the structural dimensional representation of an implicit personality theory (see Rosenberg & Sedlak, 1972, for a review).

A belief in the association of traits may also be thought of as a social schema, i.e., a theory about how the world works in a particular stimulus domain (see Hastie, 1980, and Taylor & Crocker, 1978, for reviews). The concept of schema has deep historical roots in psychology (Bartlett, 1932; Piaget, 1951). Current interest in explicating the schema concept or compatible concepts (i.e., scripts, frames, prototypes) can be found in various subdisciplines of psychology including cognitive

psychology (Bobrow & Norman, 1975; Neisser, 1976), cognitive social psychology (Cantor & Michael, 1979; Markus, 1977; Taylor & Crocker, 1978; Tesser, 1978), political psychology (Fiske & Kinder, 1978), and computer simulation of human thought (Schank & Abelson, 1977).

A schema consists in part of a knowledge structure, i.e., a representation of the attributes of that stimulus domain. A schema also includes plans for gathering and interpreting schema-related information (Taylor & Crocker, 1978). Taylor and Crocker (1978) suggest two general schema functions. First, schemas aid the perceiver in encoding and representing incoming information. Second, they add information to incoming stimuli to aid the perceiver in interpretive and inferential processes.

Social schemas or implicit personality theories are likely to evolve for social entities at various levels of specificity--e.g., a particular individual, a category of persons, roles, prototypes, people in general. A social stereotype may be considered a type of social schema or implicit personality theory that applies to a whole class of people (cf. Nisbett & Ross, 1980; Stotland & Canon, 1972; Taylor & Crocker, 1978). Upon encountering a member from a specific social group, perceivers tend to rely on their knowledge structure about that social group. In particular, perceivers selectively attend to, interpret, and recall information about the group member in terms of their preexisting theories about a group. Also, perceivers use their schemas about a group to elaborate and expand upon the given attributes of the group member. For example, in situations

that are ambiguous or provide little information, schemas serve to fill in the gaps of missing information about a person.

Complexity of the Representation of Knowledge

The present research directly concerns only one aspect of this representation of knowledge; namely, the complexity of the conceptual process engaged in when perceiving and organizing information from the environment. Although researchers differ somewhat in their conceptions of complexity, the term frequently refers to the number of conceptual dimensions employed by a person with respect to perception of the environment. Research indicates that people differ in the number of dimensions utilized in their perceptions of their social world. A cognitively complex person possesses a relatively large number of conceptual dimensions compared to a cognitively simple person. This concept is similar to Kelly's (1955) "hierarchy of constructs," Bieri's (1966) and Zajonc's (1960) "cognitive differentiation," and Scott's (1969) "dimensionality."

Schroder, Driver, and Streufert (1967) present a more elaborate view of complexity. Their framework distinguishes between three aspects of complexity: differentiation (number of unique dimensions), discrimination (fineness of organization along a dimension), and integration (organization of several dimensions within a cognitive structure).

Among the possible definitions of complexity, the present research focuses on the number of independent dimensions used to represent a

stimulus domain. Dimensional complexity is defined as the number of independent dimensions an individual brings to bear in construing and analyzing a particular domain of phenomena.

Some researchers view cognitive complexity as an interpersonal cognitive factor, referring to a trait characterizing the number of dimensions employed in perceiving other people (Bieri, 1966; Kelly, 1955). Others view cognitive complexity as a more general personality trait pervading all realms of cognitive functioning rather than only the interpersonal realm (Schroder, Driver, & Streufert, 1967). Finally, some view it as a cognitive factor that differs from one realm of experience to another (Scott, 1963, 1969).

The degree of complexity one brings to bear on stimuli from a domain is likely to be a function of one's knowledge of that domain as well as the functional demands of the task or context. The more experience a person has with a domain, the greater the number of dimensions ordinarily employed in thinking about stimuli associated with that domain. For example, a course in comparative government increased the dimensionality of students' ratings of nations (Scott, 1969). Princeton seniors rated local slang on more dimensions than did freshmen (Friendly & Glucksberg, 1970). Similarly, music majors rated musical groups on more dimensions than did business majors (Green & Carmone, 1970). Because experience and information regarding a certain domain appear to lead to greater complexity in thinking about that domain, we may conclude that dimensional

complexity is at least in part domain specific.

Applying this conclusion to interpersonal domains, intimacy and familiarity should be associated with experience. Therefore, the more familiar a person is with an individual or social group, the greater the number of dimensions employed in thinking about that individual or group member. Support for this suggestion comes from a study in which people showed higher dimensionality regarding intimately known than casually known persons (Seferi, 1968, cited in Scott, 1969).

How might experience relevant to a social domain lead to greater complexity regarding that domain? On the individual level, a first impression of a person results in a general characterization based on a small number of attributes. Further encounters lead to a richer and more complex conception of the person based on greater numbers of attributes. This process may also be observed on the social group or stereotype level. A young person, for example, having little experience with the elderly, may believe that they are all grumpy. If he encounters a friendly, enthusiastic elderly person, he is not likely to revise his schema completely. Instead, he will form a new category leaving his old category intact. As he experiences greater numbers of elderly people, he will encounter more examples of elderly people that disconfirm both expectations. This leads to greater numbers of dimensions and categories. Thus, differentiation develops through greater information, greater familiarity with more dimensions, and greater diversity.

Hypothesis One: The Ingroup-Outgroup Complexity Hypothesis

People have a more complex cognitive representation of their own group than of other groups.

Why do we expect to find this ingroup-outgroup difference? Representation of knowledge is built through experience, and it is usually the case that a person has greater frequency of contact, contact over a wider variety of situations, and contact with a greater variety of different types of people in the ingroup. For example, an elderly person most likely knows many more elderly persons, is more aware of variation in dispositions, abilities, interests, and problems of the elderly than would a young person. Likewise, a young person is more aware than an elderly person of different subgroups and dimensions of other young people. If familiarity and experience lead to greater complexity, and if people have greater familiarity and experience with ingroups than outgroups, then people will be more complex or use more independent dimensions in their thinking about ingroups than outgroups.

More specifically, I am suggesting that cognitive schemas for dealing with outgroups may be relatively simple and undifferentiated but not necessarily positive or negative in evaluative loading. Schemas related to ingroups are more complex and differentiated. The structure is likely to be organized in terms of a larger number of dimensions. There are many dimensions of variation for characterizing an ingroup member, fewer for characterizing someone in the outgroup.

To illustrate an extreme example of a simple schema, let us imagine that a person may perceive outgroup members as falling into only two categories, for instance, good and bad. A young person, for example, may be more apt to perceive an elderly man as either a grumpy complainer or a wise man with a twinkle in his eye. Similarly, an older person may be more apt to consider a young man as either wild and reckless or very responsible. Ingroup members, however, cannot be so readily characterized because they can so easily be perceived as good in some aspects and bad in others. This is because of the more complex representation or greater number of categories and dimensions for processing information concerning ingroups. In short, a richer, more developed structure is brought to bear on incoming information about an ingroup member.

Assuming that people are more complex in their thinking about ingroups than outgroups, what might be the implication for social evaluation? Together the next two hypotheses suggest an answer to this question.

Hypothesis Two: The Complexity-Extremity Hypothesis

> The less the complexity of the cognitive representation of a stimulus domain, the more extreme will be the evaluation of stimuli from that domain.

Note that this hypothesis is stated in general terms rather than in ingroup-outgroup terms. This is because the hypothesis seems applicable

and testable in a wide variety of social and nonsocial contexts. First, a case will be made for the general hypothesis. Then it will be applied to an ingroup-outgroup context in hypothesis three.

To begin, consider what is meant here by extremity. I do not refer to a consistent tendency to rate stimuli more extremely in only one direction, either positively or negatively. Rather, I refer to a tendency to rate stimuli more extremely in both directions, either more positively or negatively depending on the favorability of an information about a given stimulus.

How can extremity be measured? Consider the simplest case in which a priori one stimulus is favorable, whereas the other is unfavorable. The difference between the ratings attached to the favorable and the unfavorable stimulus provides a measure of extremity. Consider next the case in which there is a set of stimuli. Somewhat less obviously, the variance of an individual's ratings across the set of stimuli provides a measure of extremity. The variance of a set of ratings may be interpreted as the average squared distance from the mean rating. To say that ratings are far from the mean is precisely what we mean by extremity. Thus, the greater the variance of a set of ratings, the greater the extremity of the ratings.

Why might we expect the number of conceptual dimensions to influence extremity of evaluation? With fewer dimensions, one is more likely to perceive a positive stimulus as good on all dimensions or a negative

stimulus as bad on all dimensions. Thus, judgments based on fewer dimensions are more likely to be extreme. That is, one simply likes a favorable stimulus but dislikes a bad one. With more dimensions, however, stimuli cannot be so readily categorized because they can be seen as good in some respects and bad in others. Thus, a subject is likely to consider a good stimulus good on most dimensions but poor on a few dimensions. Similarly, a stimulus of poorer quality may be considered poor on a number of dimensions but good on a few others.

Consider the example of three persons on an admissions committee. Person A uses only one cognitive dimension relevant to applicants, i.e., test scores. Person B uses two cognitive dimensions, i.e., test scores and grades. Person C uses three cognitive dimensions, i.e., test scores, grades, and personality. Assume for simplicity that the three dimensions are independent, and that each person divides the applicants at the median on each dimension into high and low. Suppose that each person evaluates eight applicants and makes one overall evaluation of each one. Person A thus perceives half the applicants as high and half as low on the single dimension test scores (see Table 1; number of applicants per cell indicated below each table). With one dimension, therefore, the overall evaluations on all eight applicants are extreme in one direction or the other. Person B similarly perceives half the applicants as high on the test score dimension. Of these four applicants, however, only two are also perceived as high on the grades dimension. Similarly, Person B perceives only two

Table 1

Hypothetical Evaluations of Eight Applicants as a Function of the Number of Dimensions Used by the Rater

Person A

Test scores	
Low (1)	High (2)
1	2

4 applicants per cell

$\bar{X} = 1.5$

$S^2 = .25$

Person B

	Test scores	
Grades	Low (1)	High (2)
Low (1)	1	1.5
High (2)	1.5	2

2 applicants per cell

$\bar{X} = 1.5$

$S^2 = .125$

Person C

Personality	Grades	Test scores	
		Low (1)	High (2)
Low (1)	Low (1)	1	1.33
	High (2)	1.33	1.67
High (2)	Low (1)	1.33	1.67
	High (2)	1.67	2

1 applicant per cell

$\bar{X} = 1.5$

$S^2 = .084$

Note. Cell entries refer to the hypothetical evaluation assigned to each applicant in that cell. Numbers in parentheses indicate the value assigned to that level of the dimension. Number of applicants per cell is indicated below each table. $\bar{X}$ and S^2 refer to the mean and standard deviation across that person's set of applicant ratings.

applicants as low on both dimensions. Therefore, with two dimensions, only four of the eight applicants are perceived as extreme in one direction or the other (i.e., consistently high or low on all perceived dimensions). The other four applicants are perceived as good in one respect but bad in another. Person C also perceives half or four of the applicants high on the test score dimension, only two as high on both test score and grade dimensions, and only one applicant as high on all three dimensions. Similarly, Person C perceives only one applicant as low on all three dimensions. Therefore, with three dimensions, only two of the applicants are perceived as extreme in one direction or another.

Note that in each case the percentage of extreme applicants does not depend on which specific dimensions are used; the crucial variable is simply the number of dimensions. Therefore, the phenomenon measured is one of cognitive structure rather than content. Note also that the dimensions need not be independent, but may be partially correlated to observe the basic phenomenon.

To continue this example, suppose that each person assigns a value of "2" to a dimension perceived as high, and assigns a value of "1" to a dimension perceived as low. Suppose also that each person makes only an overall evaluation of each applicant generated by simply averaging the values assigned to each dimension.[1] Table 1 presents all possible

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[1]Anderson's (1974) research indicates that this model provides an excellent approximation to most human judgment processes. The present example is actually a simplification of Anderson's model in that initial

applicant categories for each person and the overall evaluation given to applicants in each category. Observe that the greater the number of dichotomous dimensions, the greater the number of categories. A single dichotomous dimension yields two categories, two dimensions yield four, three dimensions yield eight, n dimensions yield 2^n categories.[1]

Note that the mean across a person's set of applicant ratings is identical regardless of the number of dimensions (i.e., $\bar{X} = 1.5$ for Persons A, B, and C). More importantly, note what happens to the variance across each person's set of applicant ratings. With greater dimensions, the variance decreases and the number of extreme ratings decreases.

At this point, the hypothesis may be stated in a more precise fashion. Consider a set of randomly selected stimuli, X_i, from a given domain. Consider, further, that there are n conceptual dimensions associated with that domain, and that each stimulus from that domain is encoded along these n dimensions. Assume that these dimensions are independent. Assume also that the evaluation of each stimulus is generated by averaging its value with respect to each equally weighted dimension. Then the greater the n (i.e., the number of dimensions associated with a given domain), the smaller the variance of the evaluations across a sample of stimuli randomly selected from that domain.

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impression is ignored. This simplification does not change the general outcome of the present example.

[1]See Appendix A for an explanation of the measurement of dimensional complexity based on these assumptions.

One possible limitation of this hypothesis is as follows. Note the case in which a stimulus is consistently positive or negative on a number of stimulus features. With a complex, multidimensional cognitive structure, one is more likely to recognize this consistent pattern. In this case, the complex person will not be more moderate, but rather more extreme in rating this stimulus. Thus complex structures will not automatically result in less extreme judgments regardless of the stimuli. The speculation is that with greater complexity a person will give extreme evaluations to stimuli with highly correlated stimulus features (i.e., all very positive or very negative attributes) but moderate evaluations to stimuli with less correlated features.

With this exception stated, one may still argue for the general validity of the association between greater conceptual complexity and less extreme evaluation on the following grounds. The fundamental hypothesis does not refer to ratings of individual stimuli but rather to the variance of a <u>set</u> of ratings for randomly selected stimuli from a given domain. Because extreme examples like the one stated above are relatively rare, the general hypothesis remains valid.

What might we expect of a schema consisting of a few dimensions associated with a social domain? At the extreme, a simple schema for a domain may be only bifurcated. If the two categories or levels of the dimension are extreme, then such a schema may be characterized as bipolar in structure. Information is then encoded in such a fashion that it

is assimilated to one pole or the other. One speculation is that bifurcated schemas may tend to become bipolar. If the averaging of fewer conceptual dimensions results in more extreme evaluations, then the continuous active process of representing extreme stimuli in knowledge may result in a bipolar schema.

Evaluations processed through a bipolar schema are likely to be extreme. With a simple bipolar schema, people may perceive stimuli more globally--either good or bad. People may decide that they simply like a good stimulus, but dislike a bad one. Certain social attitude schemas appear to be bipolar, with information organized around "agree" and "disagree" poles (Judd & Kulik, 1979). Likewise, certain schemas associated with social groups may be bipolar in structure, assimilating information to either a good or bad polar category.

One final suggesting concerning why the number of conceptual dimensions influences evaluative extremity involves perceived completeness of and satisfaction with the information provided about a stimulus. When one's schema is made up of a number of dimensions, one may feel that the given information about a person is incomplete and insufficient compared to the many things one would like to know and is prepared to know about that person. A lack of information or perceived missing data on so many dimensions in the case of a complex schema may lead to reserved or suspended judgment. In this case, one would expect less confident and less extreme judgments. Note that the explanations

presented in this section are not mutually exclusive, but rather they are complementary and follow from the concept of dimensional complexity.

Hypothesis Three: The Ingroup-Outgroup Extremity Hypothesis

> If hypotheses one and two are true, then it follows that, on the average, people will evaluate outgroup members more extremely than ingroup members, more extremely in either a positive or a negative direction depending on the favorability of the information they possess about that member.

To recapitulate, hypothesis one asserts that cognitive representations for dealing with outgroup members are relatively simple with few dimensions by comparison with those for ingroup members. Outgroup representations may not be necessarily positive or negative in evaluative loading, but simply less complex. According to hypothesis two, when representations are simple, specific new information is perceived along few dimensions, leading to more extreme evaluations. Thus, together these two hypotheses indicate that people will evaluate outgroup members more extremely than ingroup members. As discussed earlier, the fundamental interpretation of evaluative extremity involves the variance of an individual's ratings across a set of stimuli (e.g., target persons). In the simple case in which there are two target persons, the range or difference between the ratings assigned to each target person provides a measure

of extremity.

A special case of this evaluative extremity prediction is a polarization effect. When two target persons are chosen so that one is favorable and the other unfavorable, and when there is no overall mean difference in evaluations for ingroup-outgroup status, then the following pattern of evaluations will emerge. Positive information about an outgroup member produces an extremely positive evaluation about that member, more positive than the evaluation of an ingroup member described by the same positive information. Similarly, negative information about an outgroup member produces an extremely negative evaluation, more negative than the evaluation of an ingroup member. Thus, evaluations of outgroup members are polarized or more extreme in both a positive and a negative direction.

The present formulation suggests that people do not simply believe that all blacks, elderly persons, or Russians are bad. Rather, it suggests that relatively low complexity regarding a social group leads to a tendency to be highly influenced by data in making an evaluative response. Lack of familiarity with a domain and other antecedents of low complexity may contribute to extreme evaluations. This puts stereotyping and prejudice in a more cognitive light. This is not to deny the existence of knee-jerk prejudice (or reverse prejudice) toward some groups by some people. Also, this is not to deny the importance of ego defensive or other affective determinants. This does suggest, however, that the evaluative aspect of

intergroup relations may also be tied to cognitive structure, and specifically to the lack of dimensionally complex interpretive mechanisms for processing information about outgroup members. This line of reasoning leads to the polarization hypothesis.

Some support exists for the polarization hypothesis. As mentioned earlier, white subjects rated a black professional higher on occupationally relevant traits than a comparable white professional (Feldman, 1972; McGillis & Jones, Note 1). Reverse prejudice or the augmentation principle can explain these results. Evidence of conditions under which a black target is not uniformly rated more positively than a comparable white target would cast doubt on the reverse prejudice explanation. There is evidence to this effect when the information concerning the black is unfavorable.

In a study by Linville and Jones (1979), white college students read and evaluated law school applications that contained incidental information on the race and sex of the applicant. By varying these factors plus whether the applicant's credentials were positive or negative in terms of general quality, we created eight realistic applicants. In addition, we considered a fourth factor--sex of the evaluating subject. The results supported the polarization hypothesis that outgroup members would be evaluated more extremely in both a positive and negative direction. Our white subjects who read a positive application rated a black applicant higher in ability, motivation, and liking than a comparable white applicant.

Those reading a negative application were more unfavorable in their appraisal of ability, motivation, and liking of a black applicant than of a white applicant with identical weak credentials. Turning to the evidence on polarization for cross-sex pairings, we found support on one evaluative dimension--activeness. Male subjects viewing a female applicant and female subjects viewing a male applicant were more extreme in their ratings (extreme in both a positive and a negative direction depending on the favorability of the applicant's credentials) than when rating an applicant of their own sex. Thus, we have evidence that polarization occurs on some evaluative dimensions when white subjects look at black applicants and when males and females look at applicants of the opposite sex. It should be noted that differential complexity relevant to ingroups and outgroups was assumed, but neither directly manipulated nor measured, in this study.

Several other investigators have obtained results which, when interpreted in terms of the formulations suggested here, may be viewed as supporting the ingroup-outgroup polarization hypothesis. Each of these findings was in fact generated by experiments designed to test other theoretical formulations, i.e., ambivalence toward the mentally ill and blacks, positive prejudice arising from liberal and flexible attitudes, and sex-role expectations regarding achievement.

Gergen and Jones (1963) suggested that people are ambivalent toward the mentally ill. Deriving their hypothesis from psychoanalytic

writings, they suggested that the ambivalence arises from an expectation of annoying characteristics of the mentally ill. People often inhibit their annoyance because of their belief that the mentally ill are not responsible for their condition or its consequences. They reasoned that this ambivalence would "amplify" a perceiver's feelings toward a mentally ill person when the behavior of the mentally ill person had clear positive or negative consequences for the perceiver. As predicted, subjects liked the benevolent mentally ill target more than the benevolent normal target, and subjects disliked the malevolent mentally ill target more than the normal target. This amplification of subjects' feelings toward the mentally ill target occurred only when the target's behavior had clear personal consequences for subjects. Note that this amplification effect is compatible with the present formulations if we assume that subjects were more familiar with, and thus more conceptually complex with respect to, normal than mentally ill persons. An ingroup-outgroup formulation cannot, however, explain why the amplification effect occurred only when the target's behavior had personal consequences for the subject.

Dienstbier (1970) reported data consistent with the present polarization hypothesis. When socially desirable values and ideas were ascribed to a target person, a black target was liked more than a white; when socially undesirable values and ideas were ascribed to a target person, however, a black target was liked less than a white. Dienstbier found that "positive prejudice" correlated with a lack of dogmatism and rigidity and

with liberal attitudes on war, crime, and rioting. He suggested that positive prejudice might be the product of either a desire to appear equalitarian, guilt reactions to negative prejudice, or perceptions that the middle-class black had accomplished more than the comparable white target. Positive prejudice and its correlates cannot, however, explain reactions to negative descriptions. Thus Dienstbier's explanation is neither complete nor parsimonious.

Several investigators applied Gergen and Jones' ambivalence-amplification hypothesis to Dienstbier's results. They suggested that ambivalence towards blacks produces this response amplification (Carver, Glass, Snyder, & Katz, 1977). They failed, however, to replicate Dienstbier's findings, but found instead that a black target was rated more positively regardless of the favorability of the personality information concerning the target.

Another study showed that a male at the top of his class was evaluated more favorably than an identically successful female. A male at the bottom of his class, however, was evaluated less favorably than a comparable female (Feather & Simon, 1975). The authors discussed their results in terms of sex-role expectations regarding achievement. An interpretation consistent with the present hypothesis involved sex as an ingroup-outgroup factor. Subjects were Australian high school girls at a single-sex school where "interaction between the sexes in an academic setting was minimal." This interpretation remains in doubt until studies

involving male subjects are conducted.

The present formulation focuses on conceptual complexity as a basis for outgroup polarization. Previous investigators have recognized the link between cognitive structure and prejudice. A simplistic cognitive style has been linked to authoritarianism (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950), dogmatism (Rokeach, 1960), and concreteness (Harvey, Hunt, & Schroder, 1961). These writers are referring to a personality syndrome that reflects an entire style of thinking about the world, that has its roots in personality needs, and tends to result in unidirectional (i.e., negative) attitudes toward various social group members. A rigid, two-valued judgment of either "good" or "bad" is expected to result in its extreme form in the perception that "ingroups are good, outgroups are bad" (Allport, 1954).

One hope of researchers has been that intergroup contact would facilitate a reduction in prejudice. Reviewers of this literature conclude that only under certain circumstances does contact decrease prejudice (cf. Amir, 1969; Cook, 1972; Foley, 1976). Factors influencing the outcome of interracial contact include situational factors (i.e., equal status, cooperative relationships, intimate association, supportive social norms, and contact with persons whose attributes contradict the prevailing stereotype) and personality variables (i.e., cognitive complexity, self-esteem, positive attitudes toward people in general).

Several investigators actually developed training programs aimed

at increasing subjects' conceptual complexity regarding an ethnic group (see Triandis, 1972). One such program reduced racial prejudice as measured by a projective test (Gardiner, 1972).

People characterized as high in differentiation when describing others tend to use more traits, to reconcile incompatible traits, and use multiple sources of information to form creative, integrated personality impressions (see Crockett, 1965; Streufert, 1972, for reviews). These findings lead investigators to suggest that people high in complexity in the interpersonal domain may be expected to exhibit a lower degree of stereotyping and group biases (Crockett, 1965; Feldman, 1972; Triandis, 1972). Several studies provide some evidence for this suggestion (Coffman, 1963; Gardiner, 1972).

Thus others have suggested a link between prejudice and simplistic conceptual processes. They have, however, focused on complexity as a general personality variable; and they have predicted a unidirectional consequence of greater complexity (i.e., less negative attitudes). In contrast, the present model focuses on complexity as a domain-specific cognitive factor; and the model makes a bidirectional prediction of evaluative extremity.

Using age as an ingroup-outgroup variable, Experiment 1 tests hypothesis one, the ingroup-outgroup complexity hypothesis. Young subjects will be more complex, i.e., use a larger number of independent conceptual dimensions, when describing their own age group than when

describing an older age group.

Again using age as an ingroup-outgroup variable, Experiment 2 tests hypotheses two and three. According to hypothesis two, the complexity-extremity hypothesis, the less the complexity of the representation of a stimulus domain, the more extreme will be the evaluations of stimuli from that domain. Thus, the less the complexity regarding older males, the more extreme will be the evaluations of older males. Correlations between complexity regarding older males and evaluations of older males are employed to test hypothesis two.

Hypothesis three, the ingroup-outgroup extremity hypothesis, is actually a special application of hypothesis two. If hypotheses one and two are correct, then it follows that people will evaluate outgroup members more extremely than ingroup members. Thus, young subjects will evaluate old target persons more extremely than young target persons, more extremely in either a positive or a negative direction depending on the favorability of the information they possess about the target. Thus evaluative extremity will take the form of a polarization effect. A factorial design manipulating age of the target and favorability of the information about the target is employed to test hypothesis three.

Experiment 3 tests hypothesis two by directly manipulating dimensional complexity through task instruction rather than by measuring individual differences in dimensional complexity. This study involves evaluations of nonsocial stimuli, i.e., cookies. According to the

complexity-extremity hypothesis, subjects instructed to think about two dimensions relevant to cookies will demonstrate more extreme ratings across a set of cookies than those instructed to think about six dimensions.

EXPERIMENT 1

Experiment 1 was designed to test the ingroup-outgroup complexity hypothesis: People have a more complex representation of their own group than of other groups. In this study, age is the ingroup-outgroup variable. Subjects completed a trait sorting task that measures dimensional complexity regarding a specific domain. Young male subjects sorted personality traits into groupings representing traits that belong together. Half the subjects were instructed to think about college-aged males while performing the trait sorting task; half were instructed to think about males in their 60's and 70's. According to this hypothesis, young males will use a larger number of independent conceptual dimensions when describing their own age group than an older age group.

Method

Subjects

Twenty-two male undergraduates were recruited for this experiment. Twelve of these subjects volunteered as part of their research participation requirement; 10 were paid $3 for their participation. Within each of the experimental conditions, there were 6 volunteers and 5 paid subjects. All subjects were tested in small groups of 1 to 6 subjects.

Complexity Instrument

A measure of a person's dimensional complexity regarding a specific domain was developed. The task involves a trait sorting method used in multidimensional scaling tasks (see Rosenberg & Sedlak, 1972, for a review). Subjects are typically asked to sort traits supplied by the experimenter according to which traits tend to go together. This trait sorting method is quite similar to a sorting task developed by Scott (1962, 1963, 1969), with a major difference being that in Scott's task subjects are asked to sort stimulus objects (e.g., nations) rather than trait attributes. As a measure of complexity, the present study utilized Scott's H statistic, an information theory-based measure reflecting dimensionality. Scott's H was computed for each subject by adapting a computer program written and utilized by Feldman and Hilterman (1977). Scott defined cognitive complexity as the number of independent binary dimension's worth of concepts the individual brings to bear in describing a particular domain of phenomena.

A pretest sample of male undergraduates was used to generate 33 personality traits. These subjects were asked to write down personality traits pertaining to males. Some were asked to think about college-aged males, whereas others were asked to think about males in their 60's and 70's. Thirty-three traits were selected for their joint frequency of occurrence in both age groups. Care was taken not to include traits that a priori either were stereotypic or more appropriate for either age group, or

related primarily to intellectual dimensions. This procedure should optimize equal latitude in forming trait groupings for each age group. Twenty-three of the 33 traits had been used previously in multidimensional scaling studies (Rosenberg & Sedlak, 1972).

Procedure

The experimenter explained that the study involved "finding out which personality traits you think are likely to go together." Each subject received a packet of 33 randomly ordered cards. Each card contained one of the traits listed in Table 2. The experimenter instructed subjects to sort the traits into groupings on any meaningful basis. She explained that they might draw on any number of resources in sorting traits according to which ones belong together. For example, they might consider a real person, type of person, group of persons, or their image of a person or group of persons. No limit was set on the number of groupings formed or the number of traits sorted into a grouping. The experimenter instructed subjects to "continue forming groupings until you think that you have formed the important ones. Form as many groupings as you find meaningful." Subjects were allowed to sort with replacement; that is, the same trait could be placed in as many groupings as desired. Subjects did not have to use every trait. The experimenter emphasized that there was no right or wrong answer, only their opinion. She instructed subjects not to put their names on the recording sheet.

Table 2

Personality Traits Used in the Study: Experiment 1

1. Understanding
2. Critical
3. Imaginative
4. Impatient
5. Humorous
6. Irritable
7. Relaxed
8. High-strung
9. Insightful
10. Superficial
11. Independent
12. Dependent
13. Caring
14. Egotistical
15. Sports-minded
16. Politically minded
17. Opinionated
18. Uninvolved
19. Determined
20. Aimless
21. Secure
22. Insecure
23. Interesting
24. Boring
25. Active
26. Passive
27. Sociable
28. Unsociable
29. Optimistic
30. Individualistic
31. Talented
32. Open-minded
33. Narrow-minded

After giving these general instructions, the experimenter added that different groups of subjects were being asked to perform the task while thinking about various specific groups of people (e.g., various professions, nationalities). She explained that this was due to the fact that thinking about people in general was a bit vague, and also because part of the project was designed to test whether this task would generalize to thinking about various groups of people. At this point, the experimenter randomly instructed half of the subjects to think about college-aged males, whereas she instructed the other half to think about males in their 60's and 70's while completing the task. No time limit was set on the task, and subjects took approximately one-half hour to complete it.

Results

As a first step in the analysis, each subject received a score for complexity as measured by Scott's H. Each subject's trait sort was used to calculate Scott's H, an information theory-based measure of conceptual complexity. Intuitively, this measure may be interpreted as the number of independent binary dimensions needed to produce a trait sort equal in complexity to that of the subject. For the present purposes, the key features of Scott's H are that, first, it measures complexity in dimensional terms; second, it is a structural measure that does not represent in any way the content or meaning of the objects or traits being sorted. (Appendix A provides several computational examples.)

A larger Scott's H indicates greater dimensional complexity. The H statistic may range between 1 and $\log_2 n$ (n = number of traits, here n = 33). Thus, in the present study H may range between 1 and $\log_2 33 = 5.04$. A minimum H score of 1.72 and a maximum H score of 4.98 were obtained in the present study. It will be recalled that we expect young male subjects to be more complex in their thinking about young males than old males. As can be seen in Table 3, young subjects do, in fact, have a higher Scott's H when thinking about young males than old males, t (20) = 2.23, $p < .04$ (all tests are two-tailed).

A count of the number of groupings formed by each subject showed a marginal trend toward young subjects forming more groupings when thinking about young than old males, t (20) = 1.98, $p < .06$. No prior prediction had been made concerning the number of groupings because it is a poor measure of complexity for the following reasons. First, a simple count of groupings does not take into consideration the redundancy of groupings. For example, a subject may create many groupings that are identical. Scott's H, however, takes into account this redundancy and reflects the number of independent attributes or dimensions used when describing a domain. Secondly, number of created groupings should be more susceptible to demand characteristics. A subject trying to appear bright or helpful could conceivably form many groupings. The statistical techniques utilized in Scott's H should be less susceptible to conscious manipulation on the part of a subject.

Table 3

Scott's H Reflecting Dimensional Complexity, and Number of Categories as a Function of Age of Target Group

Measure	Condition: Young target group (n = 11)	Condition: Old target group (n = 11)	t ratio
Scott's H (cognitive complexity)[a]	4.14	3.39	2.23**
Number of categories	11.27	7.45	1.98*

[a] Scott's H may range between 1 and $\log_2 n$ (here $\log_2 33 = 5.04$).

* $p < .1$.

** $p < .05$.

Thus, the hypothesis that young males are more complex in their thinking about their own age than another age group receives support. This result, in conjunction with a previous study demonstrating that white undergraduates were more complex regarding white than black undergraduates (Linville, 1979), supports the assumption that this is a general ingroup-outgroup phenomenon.

EXPERIMENT 2

Again using age as an ingroup-outgroup variable, Experiment 2 tests hypotheses two and three. Hypothesis two, the complexity-extremity hypothesis, proposed that the less the complexity of the representation of a stimulus domain, the more extreme will be the evaluation of stimuli from that domain. Thus in the present study, the less the complexity regarding old males, the more extreme will be evaluations regarding old males. Cognitive complexity for old males is measured as an individual difference variable. According to the hypothesis, cognitive complexity for old males will be negatively correlated with extremity of evaluation for old males.

Hypothesis three, the ingroup-outgroup extremity hypothesis, is a special application of hypothesis two, the complexity-extremity hypothesis. If hypotheses one and two are correct, then it follows that people will evaluate outgroup members more extremely than ingroup members. Thus young subjects will evaluate old male targets more extremely than young male targets. Evaluative extremity is predicted to take the form of a polarization effect. That is, when the information is favorable, the old male will be evaluated more favorably than the young male; when the

information is unfavorable, the old male will be evaluated more negatively.

Method

Overview

This experiment involved two sessions. In the first, undergraduate male subjects completed a task that assessed their dimensional complexity regarding old males. Subjects sorted personality traits into groupings representing traits that tend to belong or go together. They were instructed to think about males in their 60's and 70's while performing this sorting task. In the second session, presumably a different experiment with a different experimenter, subjects read vignettes and made judgments regarding both a favorable and an unfavorable target person (within-subjects factor). Both target persons were either college-aged males or older males (between-subjects factor).

Subjects

Thirty-six undergraduate males at Duke University volunteered for an experiment entitled "Personality Creation Game" as part of their research participation requirement. Two weeks later, a different experimenter recruited these same subjects by phone to participate in a supposedly different experiment. The second experimenter made no mention of the previous experiment, and no subject indicated suspicion concerning any connection between the two experiments. Three subjects were eliminated from the analysis, two because they improperly filled out the

questionnaires and one because he received a defective booklet. In both sessions, subjects participated in small groups of one to six persons.

Session 1: Complexity Task

Procedure. The complexity task materials and the procedural details were identical to those in session 1 of Experiment 1 in all but one respect. After giving the general instructions, the experimenter instructed all subjects to think about males in their 60's and 70's while completing the task. No time limit was set for the task, and subjects took approximately one-half hour to complete it. The experimenter thanked subjects for their participation and indicated that this was the end of the experiment. No debriefing took place at this time because these subjects were later recruited to participate in a second session.

Session 2: Evaluation Task

Two weeks after the first session, a second experimenter called these same subjects and scheduled them for a supposedly separate experiment. Subjects participated in the second session approximately three weeks after the first session.

Stimulus materials. Each subject received a booklet containing four vignettes describing four different people. Each vignette described a behavioral event in that person's day. Incidental information concerning the person's name, area of residence, and age was listed at the top of each vignette. Rating scales followed each vignette. The first two vignettes

(a 40-year-old woman then a 14-year-old girl) were fillers to disguise the purpose of the experiment and to minimize the salience of age information. The fillers were identical for all subjects.

The third and fourth vignettes contained the manipulations of age and favorability of information. Each subject read both a positive and a negative vignette counterbalanced for order. For half the subjects, these two vignettes were attributed to college-aged males (an 18- then a 19-year-old male). For the other half, the vignettes were attributed to older males (a 68- then a 69-year-old male). Two different names were attributed to the vignettes (Steve S. and Roger L.), and these names were counterbalanced for order. Thus age of the target person was a between-subjects variable, and favorability of the vignette was a within-subjects variable (referring to the fact that each subject read both a favorable and an unfavorable vignette).

The favorable vignette read as follows:

> The alarm chimed and the once still figure sprang up, wondering why his dream was suddenly interrupted. Looking out the window, he smiled at the beauty of the spring day. Today would be a busy one but there were many things which he was anxious to accomplish. After a quick egg and a refreshing shower he would be ready to begin. He frowned at the morning's headlines while eating his breakfast, wondering why the world did not learn from its past mistakes instead of repeating them. The phone rang and he answered, delighted to hear his friend at the other end. They set a date for lunch; he would have to squeeze it in, but he was anxious to talk to his friend. Feeling fresh from his shower he glanced over his list, deciding which were the priority items. He set his plan of action, and reached into the closet for a light sweater. He opened the front door and stepped out into the day, thinking how wonderful the air smelled during spring.

The unfavorable vignette read as follows:

> The morning sun shone through the window, resting on the lifeless lump curled under the comforter on the bed. The lump stirred, and a head slowly emerged, one eye staring angrily into the streaming rays. After a futile attempt to return to his peaceful slumber he sat up, resigned to the fact that the new day had begun. He slipped on his faded blue robe and shuffled to the kitchen for his usual bowl of Rice Krispies. Irritated by the merry crackling of his cereal, he reached up, flicking on the TV which sat on top of the refrigerator. Eyes fixated on the screen, he munched his cereal slowly, wondering what the day would bring. He tried to think of people who he wished would drop by to see him but could only think of many who he wished would stay away. The day was definitely beautiful, he decided, but much too hot to spend time outside. He switched to the morning movie and to his pleasant surprise found it was one of his favorites. "Might not be such a bad day after all," he decided, and leaned back, staring at the screen.

A pretest sample of male undergraduates shown both the favorable and the unfavorable vignette did not rate either vignette as more likely to describe a young than an old male.

Procedure. Upon arrival at the experimental room, the experimenter gave the following instructions:

> Dr. Larsen, a psychology professor at Duke University, is writing a personality psychology textbook. The textbook will include vignettes of real people. These vignettes will be used in the textbook to give readers a view of many different kinds of people. The vignettes were taken from a random sample of descriptions of normal people. We tried to include a range of experiences, life styles, ages, and sexes. Each portrait was written after interviewing that person. A group of us interviewed a variety of people in the Durham-Chapel Hill area, and each vignette describes part of an actual day in that person's life.
>
> Dr. Larsen is in the process of choosing which vignettes to include in the textbook. He is interested in getting students' reactions to these vignettes because students like yourself will be reading the book. I am working with Dr. Larsen on this project to get your reactions, evaluations, responses, and feelings about these people. Therefore, the way that you can help the most is to give us your honest reactions to these vignettes.

After these general instructions, the experimenter gave each subject a booklet containing four vignettes. She instructed them to read the vignette, then to turn the page and answer the questions. Subjects were allowed only to turn back to the specific vignette on which they were working. She added that the questions were identical for each vignette. She then instructed subjects not to put their names on the booklet or the rating sheets. At this point, subjects read and gave their overall evaluation for each vignette.

Upon completion of this task, subjects received a second booklet which contained the same four vignettes. The experimenter instructed subjects to reread each vignette and to answer the questions that followed. Upon completion of the second booklet, the experimenter debriefed all subjects.

Dependent measures. Immediately following each vignette in the first booklet, subjects were asked, "What is your overall reaction to this person?" Subjects responded on an 11-point scale with endpoints labeled "favorable" and "unfavorable."

Subjects received a second booklet containing the same four vignettes, each followed by the remaining dependent measures. As a manipulation check, the subject rated how much the characteristic "negative" applied to the target person. Subjects also evaluated the target person on 10 trait characteristics and trait predictions evaluative in nature (on 11-point scales). Subjects rated how much the following trait characteristics

describe the target person: active, motivated, unfriendly, warm, happy, mentally unhealthy. Subjects then responded to four trait predictive items: "How likely is it that this person would: talk cheerfully to another person, sit in a corner at a party not talking to anyone, help another person, be rude to someone?" After each of the predictive items, subjects answered the following question: "How confident are you of this prediction?" Subjects also answered the following question: "If you were to see this person one month from now, to what extent would you find this person behaving in a similar manner to the present description?" All were 11-point scales.

Next, subjects were asked, "To what extent was this person's behavior due to the personal qualities of this person (i.e., the kind of person he or she is)?" This was followed by, "To what extent was this person's behavior due to situational factors present at that time (i.e., factors incidental to the person)?" Both were 11-point scales. Then subjects answered the following questions on 11-point scales: "How revealing was this description in terms of giving you a good picture of what this person is really like?" "How well do you feel that you know this person?" "How easy was it for you to answer the questions about this person?" "Do you think that this person's behavior is typical of his/her peers and friends?" This was followed by two liking items on 11-point scales: "How much do you like this person?" "Would you like the opportunity to talk with this person?" Subjects then answered an exploratory measure regarding how

many pieces of new information they would request prior to making an additional final important judgment concerning that person. Subjects circled a number from "0" to "10."

After completing the dependent measures for both the favorable and the unfavorable vignettes, subjects answered three recall questions regarding only the last vignette they read: "What woke him up?" "What did he have for breakfast?" "What else did he do while eating breakfast?" (all open-ended). Subjects received a score from "0" to "3" indicating the number of correct items. Finally, subjects were asked: "Briefly state other factors, if any, that you think this experiment might be investigating" (also open-ended).

Results

Index Construction of Evaluation Measures

The analyses that follow involve four evaluation measures. The first measure involves subjects' responses to the question asking for their "overall reaction" to the target person. Next, subjects responded to 10 trait characteristics and trait predictions. All 10 traits were combined a priori into a trait index with scales for the negative items reversed. Third, two liking items were combined a priori into a liking index. In addition, a "general favorability index" (averaging over the overall reaction item, the 10 items in the trait index, and the two liking items) was formed to reflect all measures evaluative in nature.

Correlational Data: The Complexity-Extremity Hypothesis

The hypothesized relationship between dimensional complexity and extremity of evaluation can be directly tested by correlating complexity scores (Scott's H) with evaluative extremity scores. The complexity scores were obtained from the trait sorting task (session 1), whereas the extremity scores were obtained from the vignette evaluative task (session 2). Since all subjects completed the complexity task only in regard to older males, and the complexity-extremity hypothesis is domain specific, the appropriate analysis entails the correlation between complexity for older males and evaluations of older male targets. Thus, the analysis involves only half of the participants, i.e., those evaluating older targets ($n = 15$).

According to the complexity-extremity hypothesis, greater complexity is associated with less extreme judgment in both directions. Because each subject rated both a favorable and unfavorable older male target, a new measure may be defined reflecting rating extremity in both directions: the rating assigned to the favorable target minus the rating assigned to the negative target. This extremity score was calculated for each subject. This score reflects rating extremity such that the larger the score, the greater the evaluative rating spread. The prediction is that the higher the complexity score, the smaller the evaluative extremity score. Thus, complexity scores are expected to correlate negatively with evaluative extremity scores.

The Pearson Product Moment Correlation analysis revealed a significant negative correlation between complexity as measured by Scott's H and evaluative extremity on the general favorability index (r = -.65, p < .009) (see Table 4A, the top half of the table; all tests are two-tailed). This general favorability index (a composite index averaging over the overall reaction time, the 10 traits index items, and the 2 liking index items) should be the most reliable measure (in the sense of having the least measurement error). Therefore, it should provide the most powerful test of the hypothesis.[1] The analysis reported in Table 4A also revealed a significant negative correlation between complexity and evaluative extremity on the following separate indices: the trait index (r = -.57, p < .03) and the liking index (r = -.54, p < .05). Although not significant, complexity was also negatively related to rating extremity on the overall reaction item (r = -.36, p < .19). The Kendall Tau β rank order correlations revealed an identical pattern (see Table 4A). These correlation analyses provide direct support for the hypothesized link between complexity and evaluation. Higher dimensional complexity regarding a domain is associated with less extreme evaluations as measured by the difference

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[1]Significance levels of these separate indices should be viewed with more caution because the correlation for the different indices are not independent of each other or of the correlation of the general favorability index. These correlations are not independent because each involves Scott's H. Further, the separate indices are not independent of each other. This raises a multivariate problem regarding correlations for which there is no obvious or simple solution. Primary emphasis on the composite general favorability index avoids this problem.

Table 4

Correlations of Complexity (Scott's H) Regarding Old Males with Extremity of Evaluations of Old and Young Male Target Persons: Experiment 2

Extremity measures[a]	Pearson correlation coefficients		Kendall Tau β correlation coefficients
A. Old target persons			
General favorability index	-.65**	(15)[b]	-.52**
Overall reaction item	-.36	(15)	-.29
Trait index	-.57*	(15)	-.48**
Liking index	-.54*	(14)	-.44*
B. Young target persons			
General favorability index	.03	(18)	.15
Overall reaction item	-.16	(18)	-.16
Trait index	.12	(18)	.13
Liking index	-.11	(18)	-.10

Note. All tests are two-tailed.

[a]These measures reflect the rating or index score assigned to the favorable target minus the rating or index score assigned to the unfavorable target.

[b]Number of subjects included in the analysis is shown in parentheses.

*$p < .05$.

**$p < .01$.

between ratings for the favorable and unfavorable stimulus in that domain.

In theory, complexity should be associated with evaluation of both the favorable and the unfavorable stimuli. Because the targets were chosen so that one was favorable and the other unfavorable, the hypothesis that greater complexity is related to less extreme evaluative judgments implies the following pattern. A person high in complexity regarding older males should be less favorable toward a favorable older male and more favorable toward an unfavorable older male than should a person low in complexity. Thus, complexity and evaluation for the favorable target should be negatively correlated; complexity and evaluation for the unfavorable target should be positively correlated.

Complexity as measured by Scott's H was correlated separately with ratings for the favorable old target and the unfavorable old target. For the reasons discussed earlier, the general favorability index should provide the most powerful test of these hypotheses. Turning first to the favorable old target, the Pearson Product Moment Correlation analysis revealed a marginally significant negative correlation between Scott's H and the ratings on the general favorability index ($r = -.43$, $p < .11$). Turning next to the unfavorable old target, the analysis revealed a marginally significant positive correlation between Scott's H and the ratings on the general favorability index ($r = .50$, $p < .06$). Because the present theory being tested predicts whether the correlation in question should be positive or negative, one-tailed tests are in principle justified. Thus the two-

tailed tests reported above are conservative.

It appears, then, that the negative association between complexity and evaluative extremity arises because of the following pattern. Being more complex in regard to older males is associated with being less positive toward a favorable older male and less negative toward an unfavorable older male.

The model presented in this paper assumes that complexity is at least partially domain specific. That is, an individual is likely to be complex regarding certain domains of experience but simple regarding other domains. An alternative view is that complexity is a general personality trait pervading all interpersonal realms. Implicit in the present research is the assumption that the link between complexity and evaluation is at least partially domain specific. That is, complexity regarding a specific domain influences evaluations of stimuli only from that domain. An alternative view is that complexity regarding one interpersonal domain reflects this general trait and therefore should be at least weakly associated with evaluation of stimuli in other interpersonal domains.

According to the present model, complexity for old males is not expected to be associated with evaluative extremity for young males. Reference to Table 4B (the bottom half of the table) indicates no association between complexity for old males and evaluative extremity for young males. This result is consistent with the domain specificity assumption underlying the hypotheses tested in this research. Extremity of evaluation does not

appear to be due to a general tendency on the part of certain subjects to be extreme in regard to all interpersonal domains.

Evaluations of Target Persons: The Ingroup-Outgroup Extremity Hypothesis

The correlational results support the prediction that the less the conceptual complexity regarding a domain, the more extreme the evaluations of stimuli from that domain. These results, in conjunction with the finding of Experiment 1 that people are more conceptually complex regarding their own age group than another age group, lead to the following prediction. People will be more extreme in their evaluations of outgroup members than ingroup members. Thus, young male subjects will be more extreme in their evaluations of old than young targets. Because no main effect for age of the target person is predicted, and because the target persons were chosen so that one is favorable and the other unfavorable, evaluative extremity is expected to take the form of a polarization effect. Subjects are expected to be more positive in their appraisal of a favorable target person and more negative in their appraisal of an unfavorable target person when the target person is old rather than young (i.e., an outgroup rather than an ingroup member). If old persons prompt more extreme evaluations, then the difference between ratings of the favorable and unfavorable target person (i.e., the rating assigned to the favorable target minus the rating assigned to the unfavorable target) will be greater if the target persons are old rather than young. This difference will be reflected

in an age x favorability interaction. A main effect for favorability of the target person is expected; however, no main effect for age of the target person is expected.

The hypotheses were tested by means of analysis of variance with one between-subjects factor: age of target person (young, old), and one repeated measure: favorability of the information (referring to the fact that subjects rated both the favorable and unfavorable vignette). On the manipulation check, the unfavorable description was judged more negative than the favorable one, F (1, 31) = 55.44, $p < .0001$. The analyses that follow involve the same four evaluative measures used in the correlational analysis: an "overall reaction" item, a trait index (averaging over 10 trait characteristics and trait predictions), and a liking index (averaging over 2 liking items). A general favorability index (averaging over the overall reaction item, the 10 items in the trait index, and the 2 liking items) was again used to reflect all measures evaluative in nature.

The results show a significant main effect for favorability of the target person on the overall reaction, trait, liking, and general favorability measures ($ps < .0001$). Subjects rated the favorable target person more favorably than the unfavorable one. As predicted, no significant main effect was found for age of the target person, although a marginal age effect indicated a tendency for subjects to like the old target person (m = 6.41) more than the young one (m = 5.78), F (1, 30) = 3.16, $p < .09$. Thus, subjects were not uniformly more positive or negative toward older target persons.

A multivariate analysis was conducted on the overall reaction item, the trait index, and the liking index. This analysis revealed a significant age x favorability interaction, $\underline{F}$ (3, 28) = 3.69, $\underline{p} < .02$. As predicted, no main effect for age was found.

The age x favorability interaction was significant for the general favorability index, $\underline{F}$ (1, 31) = 7.74, $\underline{p} < .009$. This general favorability index (a composite index averaging over the overall reaction item, the 10 traits index items, and the 2 liking index items) should be the most reliable measure (in the sense of having the least measurement error). It therefore should provide the most powerful test of the hypothesis. Reference to Table 5 (see columns 3 and 6) shows that the difference between ratings for the favorable and unfavorable target person was greater when the target persons were old ($\underline{m}$ = 4.66) rather than young ($\underline{m}$ = 3.38). Examination of the means indicates that when the vignette was favorable, the old target person was rated more positively than the young target person; when the vignette was unfavorable, the old target person was rated more negatively than the young target person (see Table 5).

The age x favorability interaction was significant for the following separate measures: the overall reaction item, $\underline{F}$ (1, 31) = 5.94, $\underline{p} < .02$; and the trait index, $\underline{F}$ (1, 31) = 5.68, $\underline{p} < .02$. The interaction was marginally significant for the liking index, $\underline{F}$ (1, 30) = 2.86, $\underline{p} < .10$. Reference to Table 5 reveals an identical pattern of means for all the evaluative measures. The difference between ratings for the favorable and

Table 5

Mean Ratings of General Favorability, Overall Reaction, Trait, and Liking as a Function of Favorability of the Information and Age of the Target Person: Experiment 2

	Condition		
	Young target person (n = 18)		
Measure	Favorable	Unfavorable	Difference
General favorability index[a]	8.15	4.77	3.38
Overall reaction item[b]	8.28	5.17	3.11
Trait index[c]	8.33	4.81	3.52
Liking index[d]	7.17	4.39	2.78

Note. Higher scores indicate more positive rating. All measures reflect an 11-point scale.

[a]This measure reflects an index averaged over the overall reaction item, the 10 trait items, and the 2 liking items.

[b]This measure reflects a single item.

[c]This measure reflects an index averaged across 10 items.

[d]This measure reflects an index averaged over 2 items.

*$p < .05$.

**$p < .01$.

Table 5 (continued)

Old target person (n = 15)			F ratio
Favorable	Unfavorable	Difference	Age x favorability
9.08	4.42	4.66	7.74**
9.67	4.47	5.20	5.94*
9.09	4.45	4.64	5.68*
8.64	4.18	4.46	2.86

unfavorable target persons was greater for old than for young target persons. Young male subjects reading vignettes of older males were more positive in their appraisal of a favorable male and more negative in their appraisal of an unfavorable male than were young male subjects reading the same vignettes of young males.

Thus, the polarization hypothesis was supported. Subjects were not uniformly more positive or negative toward outgroup members, i.e., older persons; young subjects were simply more extreme in their evaluations of older persons than of young persons.

Additional Measures

In addition to the dependent variables testing the primary polarization prediction, subjects answered a number of exploratory measures aimed at examining possible underlying mechanisms responsible for the polarization effect. As explained below, only a main effect for age is predicted for each of these exploratory measures.

Future similar behavior. With a simple cognitive representation of outgroup members, given behavior may appear more complete, diagnostic, and stable. With a more complex, multidimensional cognitive representation of ingroup members, however, the given information may appear incomplete. One is prepared to accept information along many dimensions, and information along some dimensions may be missing. Also, some dimensions of the ingroup member's behavior may lead to one future prediction, whereas other dimensions may lead to another prediction. Thus,

it was predicted that the old males would be viewed as behaving one month later in a manner similar to the present description. The main effect for age was significant, F (1, 31) = 6.89, $p < .01$. Reference to the means in Table 6 indicates the expected pattern, with subjects predicting more similar future behavior on the part of the old than the young target persons. As expected, no other significant effects were found.

Causes of behavior. With a more complex, multidimensional view of ingroup members, the behavior of a specific person may be viewed as varying across situations. Subjects indicated the extent to which they regarded the target person's behavior as dispositionally caused and as situationally caused. It was predicted that the behavior of an outgroup (old) member would be seen as more dispositionally and as less situationally caused than the behavior of the ingroup (young) member. No significant effects for the dispositional or the situational item were found (see Table 6).

Sufficient information. With a complex, multidimensional representation regarding a domain, brief information may appear incomplete and insufficient. Thus subjects may regard the vignettes attributed to older target persons as more revealing; as allowing the subject to know more about the target person; as making it easier for the subject to make judgments about the target person; and as sufficient enough to require fewer pieces of new information to make further judgments. Four questions were designed to tap these four aspects of perceived sufficiency of

Table 6

Mean Ratings of Similar Future Behavior, Dispositional and Situational Causes of Behavior, Ease in Making Judgments, and Recall as a Function of Age of the Target Person: Experiment 2

Measure	Condition: Young (n = 18)	Condition: Old (n = 15)	*F* ratio
Similar future behavior	7.53	8.87	6.89*
Dispositional causes of behavior	7.78	8.60	1.67
Situational causes of behavior	4.69	5.03	.33
Ease in making judgments	7.17	8.07	2.59
Recall	2.28	2.73	3.62

Note. Higher score indicates more of the designated measure. The first four items reflect an 11-point scale. The recall measure runs from 0 to 3 items correct.

* $p < .01$.

the given information. The main effect for age was marginally significant only on the item concerning how easy it was to answer the questions about the target person, $\underline{F}$ (1, 31) = 2.59, $\underline{p} < .12$. Examination of the means (see Table 6) indicates that subjects report it easier to make judgments concerning the old than the young target persons.

If given information concerning older target persons is perceived as more complete, sufficient, and revealing, then predictions concerning the old target persons may be made with greater certainty. Analysis of the items asking subjects how certain they were about their predictions revealed no such age effect.

Perceiving older persons along fewer dimensions may result in perceiving them as typical of their age group. Subjects did not, however, rate the old target person as more typical of his friends and peers than the young target person.

Recall. One alternative explanation for the more polarized evaluations of outgroup members is based on the concepts of salience and attention. Disproportionate attention to a person or object has been shown to polarize one's response to it (Taylor & Fiske, 1978; Tesser, 1978). Subjects may pay more attention to the vignettes of older males due to the relative novelty and distinctiveness of information about an outgroup member. If subjects give more attention to the vignettes of older males, then more information may be retained about the older target persons. To explore this possibility, subjects responded to three recall questions

regarding the vignette. The recall measure was analyzed with two between-subject factors (age and favorability of information) since subjects answered recall items regarding only the last vignette they read. The main effect for age is marginally significant, F (1, 29) = 3.62, $p < .07$. Subjects retained more information about the old than the young target persons (see Table 6). As predicted, no other effects were found.

To explore the possibility that differential recall may be mediating the polarized evaluations; correlations between recall of details about the target and evaluation of the target were examined. No significant correlations emerged between recall and evaluation of the favorable target or between recall and evaluation of the unfavorable target. This result should be interpreted with caution since the recall measure had a limited scale range of 4 points (0 to 3 items recalled correctly). The present result is consistent with the growing evidence that recall of details about a person does not correlate with evaluations of that person (Anderson & Hubert, 1963; Dreben, Fiske, & Hastie, in press); and recall of details of a story involving an accident does not correlate with attributions of causality for the accident (Fiske, Taylor, Etcoff, & Laufer, in press). In these situations, at least, there is no support for the assumption that recall mediates evaluative judgments.

EXPERIMENT 3

Experiment 3 was designed to test hypothesis two: The less complex a person's conception or schema of a stimulus domain, the more extreme will be the person's evaluation of stimuli from that domain. In testing this hypothesis, I adopted the strategy of manipulating complexity through task instructions directing subjects' attention to either two or six characteristics of the stimuli.

Experiment 3 involved a food-tasting task. On each trial, the subject tasted a different cookie. Subjects in the complex condition were instructed to think about six specific characteristics of the cookie, after which they made an overall evaluative judgment, indicating how much they liked that cookie. Subjects made only one overall judgment for each cookie, never rating the cookie on the separate dimensions. This process was repeated for each cookie, with each subject rating the entire set of cookies. Trials proceeded in the same fashion in the simple condition, with one crucial difference. In the first stage of each trial, subjects were instructed to consider only two specific characteristics of the cookie. Then they made their overall rating of how much they liked that cookie.

If hypothesis two is correct, subjects in the simple (two-dimension)

condition will make more extreme overall evaluations than subjects in the complex (six-dimension) condition. That is, they will assign higher overall ratings to the cookies they like the most and lower overall ratings to the cookies they like the least. Extremity of a subject's ratings will be reflected in the standard deviation across that subject's set of cookie ratings. Therefore the standard deviation across the set of overall cookie ratings was calculated for each subject and provided the main dependent measure. Thus the standard deviation reflects a within-subject measure. The prediction was that subjects instructed to think about two dimensions would demonstrate a higher standard deviation across their set of cookie ratings than subjects instructed to think about six dimensions.

Method

Subjects

Thirty-six undergraduate subjects volunteered as part of their research requirement to participate in a study entitled "Chocolate-chip cookies: subjective preferences." Approximately equal numbers of males and females participated. All subjects were tested in small groups of two to six persons.

Materials

A pretest sample of subjects listed dimensions relevant to chocolate-chip cookies. From these responses, the six most frequently listed dimensions were chosen (i.e., number and quality of the chocolate chips,

degree of sweetness and richness, degree of buttery taste, fresh or stale, soft or firm, crisp or chewy). Five different types of chocolate-chip cookies were selected to represent a range of quality (i.e., three brands of store-bought cookies, delicatessen cookies, and homemade cookies).

Procedure

The experimenter informed subjects that they would taste and evaluate five different chocolate-chip cookies. She explained that the purpose of the study was to find out if people evaluate stimuli such as persons or food differently if they give their immediate impression as opposed to thinking about the stimulus prior to giving their impression. She further explained that some groups of subjects would make immediate judgments whereas others would think about each cookie prior to making a judgment. All subjects were then informed that they had been randomly assigned to the condition in which they would think about the cookie prior to making a judgment.

The experimenter gave each subject a booklet containing an instruction sheet and a rating scale for each of the five cookies. After tasting each cookie, the subjects read the instruction sheet asking them to "think about this cookie in terms of the following dimensions." Half the subjects received instructions to think about the cookie in terms of two dimensions (simple condition); the other half received instructions to think about six dimensions (complex condition). Subjects were informed that they would read an identical instruction sheet prior to tasting each cookie. In the

six-dimension condition, all six dimensions were listed. In the two-dimension condition, only two dimensions were listed. All possible permutations of six dimensions taken two at a time were used in this condition. Since there were three more subjects in this condition than there were permutations, three additional permutations were randomly selected to be repeated for these subjects. The experimenter encouraged subjects to continue thinking about the cookie for the entire one and one-half minute period.

Immediately following this carefully timed period, subjects turned to a separate sheet instructing them to give only their overall impression of the cookie. The experimenter explained that their evaluation did not have to reflect only the dimensions previously suggested. Subjects made their overall rating by placing an "X" anywhere along a five-inch line with end points labeled "favorable" and "unfavorable." This scale was later divided into 41 points for coding purposes. In order to anchor the scale, the experimenter instructed subjects to think of the scale in terms of a range of chocolate-chip cookies, that is, the best and worst chocolate-chip cookies they had ever tasted. Subjects followed this procedure for all five cookies, sipping water prior to tasting the next cookie. Note that subjects were informed of the same relevant dimensions prior to tasting the first and each subsequent cookie. Note also that subjects never rated or expected to rate the cookies on the separate dimensions. Care was taken to show subjects the rating sheet prior to tasting any cookie. In

addition, the experimenter emphasized that subjects were to mark only their overall impression of that cookie. This procedure should minimize any experimental demand for consistency between one's ratings along several dimensions of the cookie and one's overall rating of that cookie. At the end of the session, the experimenter fully debriefed all subjects.

Results

The standard deviation of the overall evaluative ratings across all five cookies was calculated for each subject and provides the primary dependent variable. (Thus the standard deviation reflects a within-subject measure.) As predicted, subjects provided with two dimensions showed a higher standard deviation across the five cookie ratings than did subjects provided with six dimensions, $t(34) = 2.16$, $p < .04$ (see Table 7). The range across all five cookie ratings (reflecting a within-subject measure) was also calculated for each subject. Consistent with the standard deviation measure, subjects considering two dimensions showed a larger range across their five cookie ratings than did subjects considering six dimensions, $t(34) = 2.05$, $p < .05$ (see Table 7). Thus, on both measures of dispersion, subjects instructed to consider fewer dimensions were more extreme in their evaluative ratings.

The mean of all five cookie ratings (reflecting a within-subject measure) was calculated for each subject. An examination of this mean measure indicates that there is no significant difference in the mean favorability rating of the five cookies between the two- and the six-dimension

Table 7

Standard Deviation, Range, and Mean of Evaluative Ratings as a Function of Number of Suggested Dimensions: Experiment 3

Measure (across 5 ratings for each subject)	Condition: Simple (two dimensions) (n = 18)	Condition: Complex (six dimensions) (n = 18)	*t* ratio
Standard deviation[a]	12.36	10.46	2.16*
Range[b]	30.11	25.72	2.05*
Mean[c]	20.81	22.37	1.08

Note. Higher scores for the mean measure indicates more favorable rating.

[a]This measure reflects the standard deviation across the five cookie ratings for each subject.

[b]This measure reflects the range across the five cookie ratings for each subject.

[c]This measure reflects the mean of the five cookie ratings for each subject.

*$p < .05$.

conditions, t (34) = 1.08, p = n.s. (see Table 7). Therefore, the difference in range and standard deviation was not due to a floor or ceiling effect in the six-dimension condition.

These results support the hypothesis that dimensional complexity has evaluative consequences. Thinking about two dimensions relevant to a set of stimuli resulted in more extreme ratings or a greater standard deviation across the set of ratings than thinking about six dimensions. If the speculations concerning complexity and evaluations are correct, the six-dimension condition is analogous to the ingroup (i.e., young) condition in Experiment 2; whereas the two-dimension condition is analogous to the outgroup (i.e., old) condition. Thus an identical pattern of results emerges when directly manipulating dimensional complexity, when manipulating social group status, and when using Scott's H to measure individual differences in dimensional complexity.

DISCUSSION

The present research has been an attempt to develop and test a model of social judgment consisting of three theoretically linked hypotheses. A special interest has been the application of this model to the area of intergroup evaluative biases. The pattern of results supports a link between a cognitive, structural variable and the evaluative inference process. More specifically, the pattern of results supports the relevance of dimensional complexity to ingroup-outgroup evaluative biases. Consider, in turn, the specific results of each of the three hypotheses.

Experiment 1 tested hypothesis one, the ingroup-outgroup complexity hypothesis: People have a more complex cognitive representation of their own group than of other groups. Young males did indeed demonstrate greater dimensional complexity in their descriptions of young males than in their descriptions of old males.

Hypothesis two, the complexity-extremity hypothesis, proposed that the less the complexity of the representation of a stimulus domain, the more extreme will be the evaluation of stimuli from that domain. Results from Experiments 2 and 3 provide support for this hypothesis. In Experiment 2, cognitive complexity for older males was measured as an

individual difference variable. Cognitive complexity regarding old males was negatively correlated with extremity of evaluation for old males. That is, the fewer the dimensions a subject used to describe old males, the more extreme were the ratings he assigned to the favorable and the unfavorable old male targets. These correlational results are a relatively unconfounded and direct test of the speculation that cognitive complexity is a mechanism mediating evaluative judgment.

In Experiment 3, cognitive complexity was manipulated through task instructions rather than measured as an individual difference variable. Subjects instructed to think about two dimensions relevant to cookies made more extreme ratings across a set of cookies than did subjects instructed to think about six dimensions.

Hypothesis three, the ingroup-outgroup extremity hypothesis, is actually a special application of hypothesis two, the complexity-extremity hypothesis. If hypotheses one and two are correct, then it follows that people will evaluate outgroup members more extremely than ingroup members. Results of Experiment 2 support this prediction. Young subjects evaluated old male targets more extremely than young male targets. Evaluative extremity took the predicted form of a polarization pattern. When the information about the male was favorable, the old male was evaluated more positively than the young male; when the information was unfavorable, the old male was evaluated more negatively.

Thus we have three conceptual replications of the complexity-

extremity relationship. Less complexity--either assumed in perceptions of outgroups, measured as an individual difference variable, or manipulated through task instructions--resulted in more extreme evaluations.

Nature of the Complexity-Extremity Link

The predicted relationship between cognitive complexity and evaluative extremity received support using social (age) as well as nonsocial (cookie) domains. This fact leads to the speculation that this relationship is not limited to domains that are usually assumed to have a strong affective component (e.g., social groups or stereotypes). Support for the hypothesis using such diverse stimuli as profiles of the daily lives of old males, cookies, and essays (Linville, Note 2) leads to the speculation that the model may have wide applicability.

The correlational results in Experiment 2 are supportive of several additional assumptions regarding the nature of the link between cognitive complexity and evaluative extremity. First, implicit in this research is the assumption that the link between complexity and evaluation is at least partially domain specific. That is, complexity regarding a specific domain influences evaluations of stimuli only from that domain. An alternative view is that complexity is a general personality trait pervading all interpersonal realms. To the extent that this alternative view is correct, a measure of complexity regarding one interpersonal domain should reflect this general trait and therefore be at least weakly associated with

evaluations of stimuli in other interpersonal domains. Whereas the present results should be viewed with caution because of the limited test of this question, the results do lend support to a domain specific relationship between complexity and evaluation. Complexity for old males was associated with evaluations of old males but not of young males.

Second, implicit also in this research is the assumption that people are simple or complex in terms of a general domain instead of a subset of specific stimuli from that domain. Therefore the individual difference measure of complexity was made with respect to one subset of stimuli in a domain (i.e., traits in a sorting task), and the evaluations were made with respect to another subset of stimuli (i.e., descriptions of the daily activities of the target persons). The present results are more impressive than if both complexity scores and evaluation scores had been obtained from the same stimuli. In short, whereas the relationship between complexity and evaluative extremity appears to be specific to a given domain, the relationship appears to be general to various stimuli within a domain.

Other Direct Evidence for the Hypotheses

A previous study (Linville, 1979) provides additional support for hypothesis one, the ingroup-outgroup complexity hypothesis. White undergraduates demonstrated greater complexity in their descriptions of white than black undergraduates. Similar results using race and age as the

group membership variable support the assumption that this is a general ingroup-outgroup phenomenon.

Additional evidence also supports hypothesis two, the complexity-extremity hypothesis. Subjects instructed to think about two dimensions relevant to law school application essays rated the essays more extremely than subjects instructed to think about six dimensions (Linville, Note 2).

Results of a study by Linville and Jones (1979) lend support to hypothesis three. White subjects viewing a black applicant, and male and female subjects viewing an opposite sex applicant, gave more extreme evaluations relevant to law school performance than subjects viewing an applicant of the same race or sex. These results, along with those reported above, show that the polarization effect can be found across a range of social groups defined by age, race, and gender. The results also indicate that the polarization effect can be found across a range of intellectual as well as personality dependent measures.

Implications for the Stereotyping and Intergroup Perception Literature

The present results raise several issues of concern relevant to the stereotyping and intergroup perception literature. The present results support the speculation that a cognitive mechanism influences intergroup evaluation. In addition, the present results support a bidirectional as opposed to a unidirectional intergroup evaluative bias. These results seem to contradict a substantial body of literature demonstrating ingroup

favoritism, i.e., the tendency to rate one's own group more favorably than another group. Whereas further research is needed to examine the boundary conditions of both predictions, several methodological differences lead to the following speculations.

First, in the research paradigm demonstrating ingroup favoritism, subjects often evaluate the entire ingroup or outgroup. In the present research, however, subjects evaluated specific group members. Second, in the research demonstrating ingroup favoritism, subjects are provided with little information about group members beyond ingroup-outgroup status. In the present research, subjects are provided with more complex information about target persons. In the ingroup favoritism research, group status per se is the only available basis for making evaluations. In the present research, however, group status provides a basis for how to process additional information.

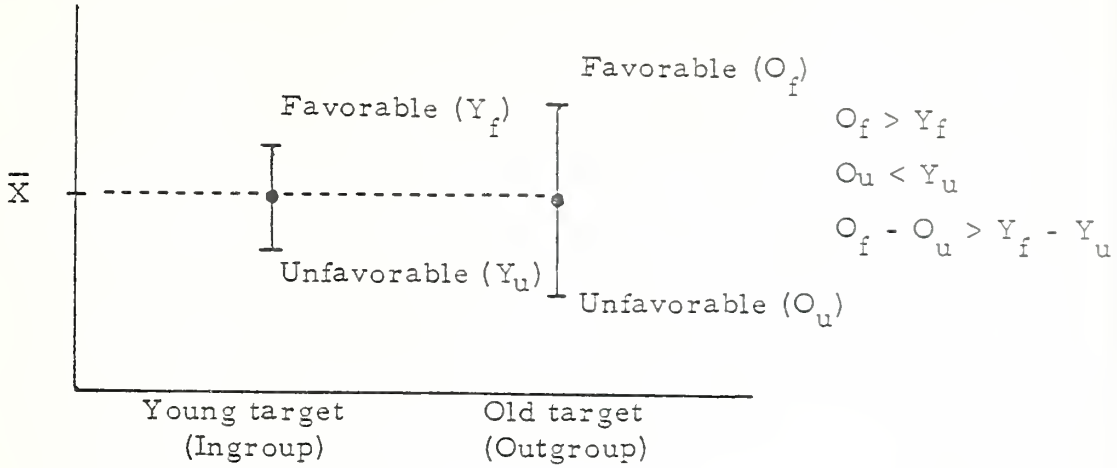
Unidirectional predictions such as ingroup favoritism (e.g., predicting that old males would be evaluated less favorably by young subjects) and the augmentation principle (e.g., predicting that older males would be evaluated more favorably) are reliable phenomena. The present model predicting that outgroup members will be evaluated more extremely is not, in fact, incompatible with predictions of traditional prejudice, ingroup favoritism, augmentation, or other unidirectional predictions. Any such bias might coexist with the present model in the following fashion.

The prediction is that outgroup members will be evaluated more extremely than ingroup members. The fundamental interpretation of evaluative extremity is the variance of an individual's ratings across a set of stimuli (e.g., target persons). In the simple case in which there are two target persons, the range or difference between the ratings attached to the two target persons provides a measure of extremity.

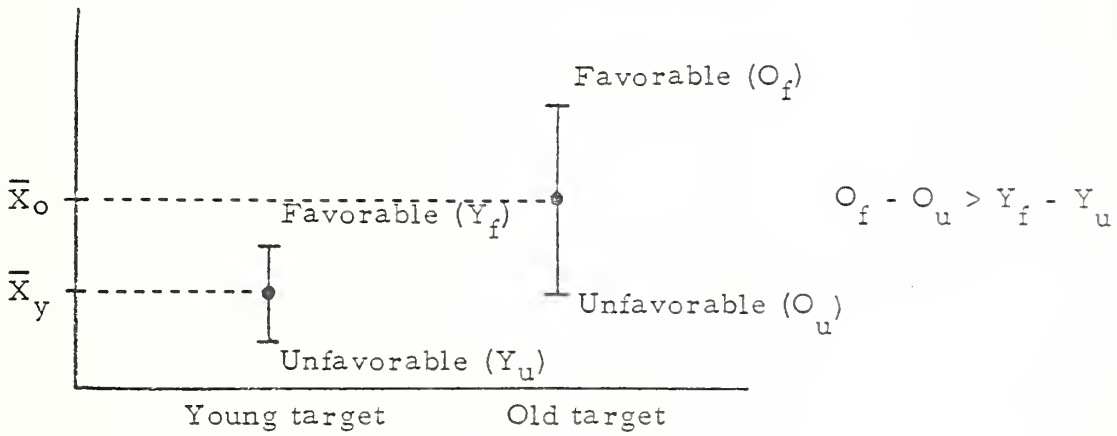
The polarization effect is a special case of this extremity effect. When two target persons are chosen so that one is favorable and the other unfavorable, and when there is no overall mean difference in evaluations of the ingroup versus the outgroup, then the following pattern of evaluations will emerge. Using age as an example, Figure 1A presents polarized evaluations for old target persons. The difference between the ratings attached to the favorable and unfavorable target person will be greater when the targets are outgroup members rather than ingroup members ($O_f - O_u > Y_f - Y_u$). But the unique feature of this case is that when the target is favorable the outgroup member is evaluated more positively than the ingroup member ($O_f > Y_f$); when the target is unfavorable, the outgroup member is evaluated more negatively ($O_u < Y_u$).

Next consider the case in which augmentation results in more favorable evaluations of old targets (see Figure 1B). Despite the general bias in favor of old targets ($\bar{X}_o > \bar{X}_y$), the fundamental prediction is supported: The difference between ratings attached to the favorable and unfavorable target is greater if the targets are old rather than young ($O_f - O_u > Y_f - Y_u$).

1A. No main effect for group membership



1B. Main effect for group membership: augmentation



1C. Main effect for group membership: ingroup favoritism

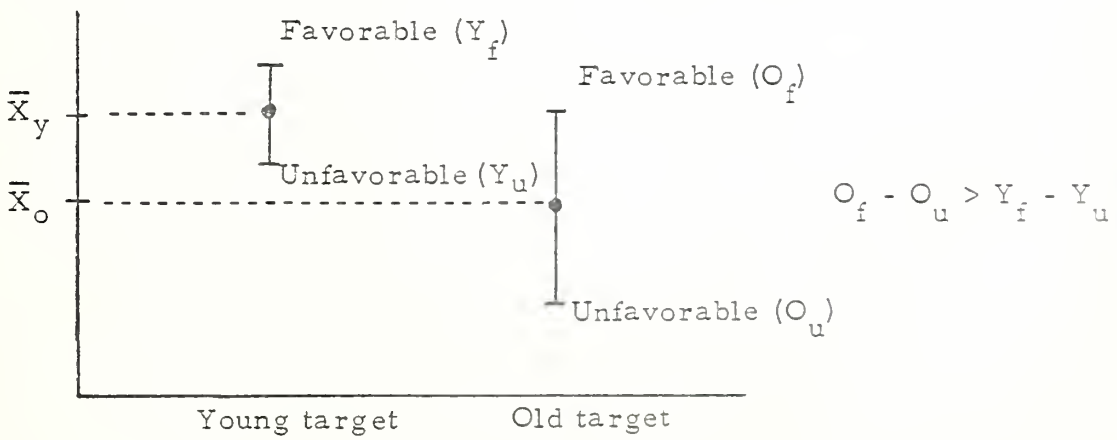


Figure 1. Illustration of the Ingroup-Outgroup Extremity Effect With and Without a Main Effect for Group Membership.

Finally, consider the case in which ingroup favoritism results in more favorable evaluations of younger targets (see Figure 1C). Despite the general bias against old targets ($\bar{X}_y > \bar{X}_o$), the fundamental prediction is again supported: The difference between ratings attached to the favorable and unfavorable target person remains greater if the targets are old rather than young. Thus regardless of mean evaluation difference between the ingroup and the outgroup, evaluations remain more extreme for the outgroup members. Polarized evaluations of outgroup members, however, depend on both the successful choice of a favorable and an unfavorable target person and on a lack of mean evaluation difference between the ingroup and the outgroup. Future research needs to specify the contextual factors that contribute to ingroup-outgroup distinctions, to complex rather than simple processing of information, and to bidirectional rather than unidirectional biases.

Appendix A

Sample Groups of Traits and Computation
of Scott's H Measuring Dimensional Complexity

Traits Presented to Subject:	Understanding Critical	Talented Aimless

The Subject's Sorting Pattern:

Group 1	Group 2	Group 3
Understanding Talented	Critical Aimless	Critical

Subject's Total List of Traits and Groups in which They are Included:

Understanding 1
Critical 23
Talented 1
Aimless 2

Combination of Groups:	None	1	2	3	12	13	23	123	
Frequency (n_i)	0	2	1	0	0	0	1	0	n=4

$$H=\log_2 n-\frac{1}{n}\sum n_i \log_2 n_i$$

n = total number of traits (here 4)

n_i = the number of traits that appear in a particular combination of groups, $n = \sum n_i$

To calculate H, we compute the frequency, n_i, with which each combination of groups appears. For example, two traits ("understanding" and "talented") appear in group 1 but no other group. Thus, two traits may be classified as falling in the combination "1". By contrast, the trait "critical" appears in group 2 and group 3. No other traits appeared uniquely in groups 2 and 3. Thus, the combination "23" has only one member ("critical") or a frequency, n_i, of 1. Finally, the trait "aimless" occurs only in group 2. Therefore, combination "2" has a membership or frequency, n_i, of 1.

$$H = \log_2 4-\frac{1}{4}(2\log_2 2+1\log_2 1+1\log_2 1)$$
$$= 2-\frac{1}{4}(2+0+0+0)=1.5$$

Other Samples

Sample 2

Group 1	Group2	Group 3	Group 4
Understanding	Critical	Talented	Aimless

$H = 2 - \frac{1}{4}(0) = 2$

Sample 3

Group 1	Group 2
Understanding	Critical
Talented	Aimless

$H = 2 - \frac{1}{4}(2 \log_2 2 + 2 \log_2 2)$

$= 2-1 = 1$

Note that sample 2 involves the maximum complexity possible with four traits; sample 3 involves the minimum complexity with four traits given that the subject sorts using at least one binary dimension.

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